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10/811,973

03/30/2004

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EXAMINER

SANDVIK, BENJAMIN P

ART UNIT

PAPER NUMBER

2826

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE | DELIVERY MODE |
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3 MONTHS

04/30/2007

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                 |               |  |
|------------------------------|-----------------|---------------|--|
| <b>Office Action Summary</b> | Application No. | Applicant(s)  |  |
|                              | 10/811,973      | NOZAWA ET AL. |  |
|                              | Examiner        | Art Unit      |  |
|                              | Ben P. Sandvik  | 2826          |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 12 February 2007.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6,9,11-16 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6,9,11-16 and 19-21 is/are rejected.
- 7) ☒ Claim(s) 1 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Claim Objections***

Claim 1 is objected to because of the following informalities: the phrase "less that" appears to be a typographical error. Appropriate correction is required.

### ***Response to Arguments***

Applicant's arguments filed 2/12/2007 have been fully considered but they are not persuasive. The applicant argues that the JISH4541 standard "does not equate to guidance for providing features recited in the claimed invention." The examiner respectfully disagrees and submits that the JISH4541 standard, which is incorporated into the Ochi reference, discloses standard copper ratios for Dumet wires including the claimed ratios of claim 1. Thus, one of ordinary skill in the art could consult the JISH4541 and decide to use a Dumet wire with a copper ratio of 20-25% in combination with the invention of Ochi.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971). Furthermore, although the Takeno reference may be directed to a different

endeavor than the Ochi reference, the Takeno reference contains teachings that are relevant to the Ochi reference and motivation to modify based on those teachings as describe in the rejection below.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 2, 11-13, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi in view of Takeno et al (U.S. Patent #5532434).

With respect to **claim 1**, Ochi teaches first and second electrodes having layers containing copper as main components (Fig. 4, 3A and 3B); a semiconductor element arranged between said first and second electrodes and electrically connected to said first and second electrodes (Fig. 4, 2); and a glass sealing member which seals said first electrode, said semiconductor element, and said second electrode (Fig. 4, 1); wherein, in the first and second electrodes, ratios of the layers containing copper as main components are not less than 20 wt% and equal to or less than 25 wt% (Fig. 2, 12 and Col 1 Ln 26, JISH4541 standard); said first and second electrodes have copper oxide layers formed on the outer peripheries of said layers containing copper as main components (Fig. 2, 13 and Col 1 Ln 33-34), the copper oxide layers contacting with said glass

sealing member, but does not teach that the thickness of the copper oxide layers are 1.5 micrometers or less. Takeno teaches a copper wire that has a copper oxide layer of 0.1 micrometers (Col 6 Ln 18-19). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the oxide of Ocha less than 1.5 micrometers as taught by Takeno in order to use the oxide to absorb laser light in a laser process.

With respect to **claim 2**, Ochi teaches that said first and second electrodes are constituted by Dumet wires (Col 1 Ln 26).

With respect to **claim 11**, Ochi teaches first and second electrodes wherein the ratios said layers containing copper as main components fall within the range of 21 to 24 wt% (Col 1 Ln 26).

With respect to **claim 12**, Ochi teaches that said first and second electrodes have core portions (Fig. 2, 11) and said layers containing copper as main components, said layers being formed on the outer peripheries of said core portions (Fig. 2, 13).

With respect to **claim 13**, Ochi teaches that said core portions of said first and second electrodes comprise a nickel-containing alloy (Col 1 Ln 32).

With respect to **claim 16**, Ochi teaches that said core portions of said first and second electrodes are comprised of an alloy containing iron and nickel as main components (Col 1 Ln 32).

Claims 3, 9, 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi, in view of Robinson et al (U.S. Patent #4042951).

With respect to **claim 3**, Ochi teaches all of the limitations of claim 1, but does not teach that said semiconductor element is a diode. Robinson teaches a semiconductor device that is a diode (Col 1 Ln 53-56). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the device of Ochi with a diode as taught by Robinson in order to adapt the device to diode functions.

With respect to **claim 9**, Ochi teaches that the thickness of said layers containing copper as main components have a diameter of 0.5 mm (Col 3 Ln 51) but does not teach that the semiconductor element has a bump electrode; wherein the thickness of said layers containing copper as main components are larger than said thickness of said bump electrode. Robinson teaches a semiconductor element having a bump electrode (Fig. 1, 15 and Col 2 Ln 46, the bump is 1-4 mils thick), the thickness of copper containing layers being larger than the thickness of the bump electrode (Fig. 2, 31 and 32). It would have been obvious to one of ordinary skill in the art at the time the invention was made to make the device of Ochi with a semiconductor element having a bump electrode in order to improve the reliability of the connection to the Dumet electrode, and to make the thickness of the copper containing layers larger than the thickness of the bump electrode in order to maintain a small size of the package.

With respect to **claim 14**, Ochi teaches all of the limitations of claim 12, but does not teach that the nickel-containing alloy has a nickel content of 45 wt% or less. Robinson teaches a core portion comprised of a nickel-containing alloy having a nickel content of 45 wt% or less (Col 2 Ln 23-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce the core portion of Ochi with a nickel content of 45 wt% or less as taught by Robinson in order to control the resistance of the electrode.

With respect to **claim 15**, Ochi teaches all of the limitations of claim 12, but does not teach that the nickel-containing alloy has a nickel content of 41-43 wt% or less. Robinson teaches a core portion comprised of a nickel-containing alloy having a nickel content of 41-43 wt% or less (Col 2 Ln 23-24). It would have been obvious to one of ordinary skill in the art at the time the invention was made to produce the core portion of Ochi with a nickel content of 41-43 wt% or less as taught by Robinson in order to control the resistance of the electrode.

Claims 5 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi and Robinson, in view of Davis et al (U.S. Patent #3723835).

With respect to **claims 5 and 21**, Ochi does not teach that the semiconductor element has a metal electrode, wherein a sealing temperature of said glass sealing member is a temperature at which silicification of said metal electrode of the semiconductor element is not enhanced. Robinson teaches a semiconductor element with a metal electrode (Fig. 1, 15); and a sealing

temperature of the glass sealing member (Col 3 Ln 17-20) is a temperature at which silicification of said metal electrode is not enhanced. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the device of Ochi with a semiconductor element having a metal electrode in order to make a reliable connection to the Dumet electrode, and to seal the glass member at a temperature at which silicification of said metal electrode is not enhanced in order to maintain the desired characteristics of the device. Davis teaches a glass-sealing member which is softened and sealed at a temperature less than 630° C (Col 3 Ln 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to seal the glass of Ochi and Robinson at a temperature of less than 630° C as taught by Davis in order prevent degradation of the diode.

Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi, in view of Davis.

With respect to **claim 6**, Ochi does not teach a glass material (potassium oxide, Col 3 Ln 40) that has a glass softening point of 560° C or less. Davis teaches a glass-sealing member which is softened and sealed at a temperature less than 630° C (Col 3 Ln 1-5). It would have been obvious to one of ordinary skill in the art at the time the invention was made to seal the glass of Ochi and Robinson at a temperature of less than 630° C as taught by Davis in order prevent degradation of the diode.

Claims 4, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ochi, in view of Einthoven (U.S. Patent #4742377).

With respect to **claims 4, 19, and 20**, Ochi teaches all of the limitations of claim 1, but does not teach that said semiconductor element comprises by a Schottky barrier diode having: a semiconductor substrate; an epitaxial layer formed on the semiconductor substrate; and a metal electrode formed on the epitaxial layer. Einthoven teaches a semiconductor element comprising a Schottky barrier diode (abstract) having: a semiconductor substrate (Fig. 4, 11); an epitaxial layer formed on the semiconductor substrate (Fig. 4, 5); and a metal electrode formed on the epitaxial layer (Fig. 4, 13, 15, 17) having a tungsten film (Col 3 Ln 4). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the device of Ochi with a semiconductor device comprising a Schottky barrier diode as taught by Einthoven in order to use the device as a rectifier.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not

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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ben P. Sandvik whose telephone number is (571) 272-8446. The examiner can normally be reached on Mon-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on 571-272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

bps

  
EVAN PERT  
PRIMARY EXAMINER